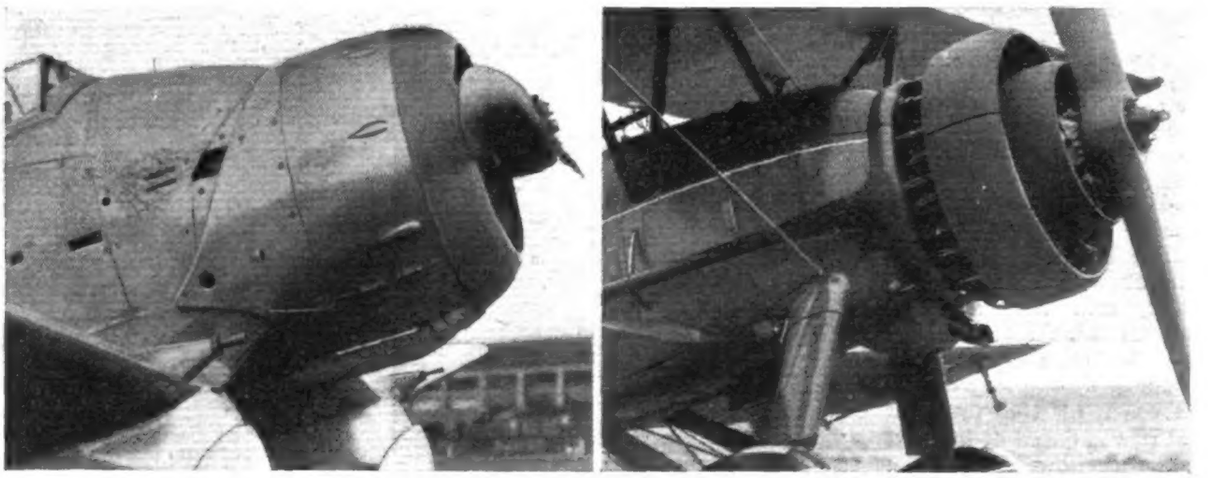


A somewhat unusual cowling was fitted to the Mercury engine of the Bristol 133 fighter. On the right is the A.W. XVI (Panther) of a few years ago ; it had an inner flange cowl in addition to its Townend ring. This arrangement is not now standard on the two-row Siddeleys. (*Flight* photographs.)

the minimum engine drag for a particular machine and engine operating condition. The volume of air required to cool an engine varies considerably with the speed of the machine in which it is fitted, which means that the cowling which functions quite satisfactorily at high speeds, may be deficient at climbing speeds, with resulting overheating of the engine. Experiments with adjustable noses for N.A.C.A. cowlings presented mechanical difficulties, but flaps placed round the trailing edge gave satisfaction. The position of these flaps can be controlled from the cockpit, and on a typical installation have a movement of about 30 deg.

Although the cowling and cooling of four- and six-cylinder-in-line engines appears perfectly straightforward (and, in practice, is so), this perfection has been attained only by arduous experiments.

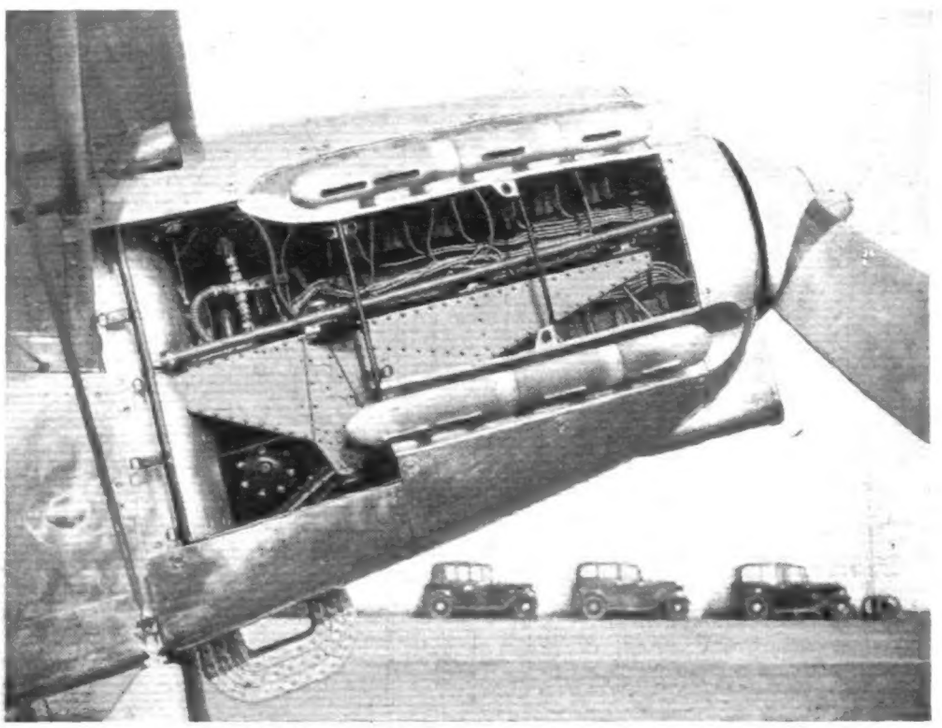
The De Havilland Gipsy Six and Major engines embody an air scoop on their port side, the engine being kept clear of obstruction in this region. From the inlet in the nose the air rushes down this scoop and is trapped by a plate at the rear. So it flows between the cylinders, and is caught by baffles on the starboard side, which conduct the leakage through gaps corresponding to the centre line of each cylinder barrel. Cylinder head baffles conduct air over the combustion chamber and exhaust ports, but it is not necessary to feed the inlet ports. The heated air is sucked from the main engine bay out of a slot formed by the cowling on the starboard side.

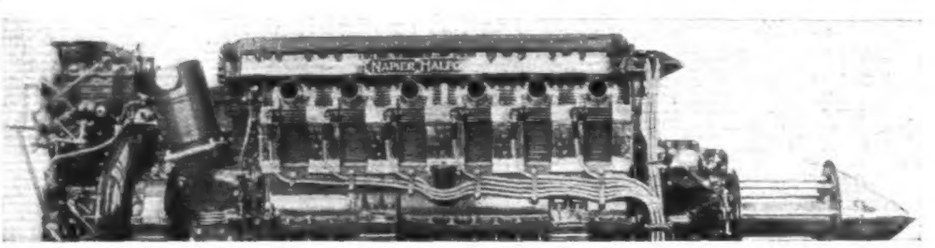
In some installations a small inlet can be seen alongside the main scoop. This is to admit air to the front cylinder. Yet a third hole may be provided to cool the exhaust manifold.

The latest Cirrus Hermes practice provides for a cooling chute, the rear half of which is open along its top section. The "screen" which holds the air in the chute to the cylinders is virtually a right-angled continuation of the side of the scoop. Baffling is provided all along the cylinder bank on the starboard side, from which viewpoint the cylinder barrels are completely hidden.

New problems naturally arose with the introduction of D. Napier and Son, Ltd., of their Rapier and Dagger "H" type air-cooled four-bank engines, but, as a result of very extensive experimental work, adequate cooling has been secured with very long drag.

The Napier engines are cooled by an arrangement of air ducts, baffles, and exit louvres. The air flows into the entry duct, thence to pressure chambers formed by the upper and lower pairs of cylinder banks, and then, after passing between the cylinders and baffles, is discharged via the louvres to the outside of the engine cowling. A





The top picture shows one bank of a Napier Dagger 24-cylinder engine with its inter-cylinder deflectors. Note in the bottom view—a *Flight* photograph of a similar engine installed in a Hawker Hector—the position of the air scoops for top and bottom cylinder banks.